DIVISION 23

SECTION 23 53 12

VACUUM CONDENSATE PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide all the condensate return pumps as specified and as needed for a complete and proper installation, as specified herein and as shown and scheduled on the Contract Drawings.

1.02 RELATED SECTIONS

A. Related Sections:

1. Section 01 51 23 - Temporary Heating
2. Section 23 05 00 – Common Work Results For HVAC
3. Section 23 05 13 - Common Motor Requirements For HVAC Equipment
4. Section 23 05 23 - General Duty Valves For HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 53 - Identification for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 13 - Instrumentation and Control for HVAC
10. Section 23 09 14 - Natural Gas and CO Gas Leak Detection Equipment
11. Section 23 09 23 - Control Dampers
12. Section 23 09 24 - Steam Flow Meters
13. Section 23 22 13 - Steam and Condensate Heating Piping
14. Section 23 25 19 - Water Treatment for Steam System Feedwater
15. Section 23 31 13 - Metal Ducts
16. Section 23 33 00 - Air Duct Accessories
17. Section 23 34 16 - Boiler Room Combustion Air Makeup And Ventilation System
18. Section 23 51 00 - Chimney Liner
19. Section 23 51 16 - Prefabricated Breechings and Accessories
20. Section 23 51 23 - Gas Vents
21. Section 23 52 39 - Firetube Boilers
22. Section 23 53 12 - Vacuum Condensate Pumps
23. Section 23 53 13 - Boiler Feedwater Pumps

1.03 SUPPLEMENTAL SUBMITTALS

A. Product Data: Submit manufacturer's pump characteristic performance curves with selection points clearly labeled, net-positive suction head characteristics, and rated capacity of selected model.

B. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data:

1. Maintenance manual.

D. Certificate: Contractor's start-up and demonstration affidavit.

1.04 SUPPLEMENTAL QUALITY ASSURANCE

A. Codes and Standards:

1. UL and NEMA Compliance: Provide electric motors and ancillary electrical components which are UL-listed and labeled, and which comply with NEMA standards.
2. NEC Compliance: Install condensate pumps in accordance with applicable electrical requirements of NFPA 70: National Electrical Code.
3. ASME Compliance: Comply with applicable requirements of ASME Boiler and Pressure Vessel Code.
4. ASHRAE Compliance: Comply with applicable standard for condensate pumps.
5. Testing of material and equipment shall be in accordance with 28-113 of the Administrative Code (reference MC 301.5). Whenever the NYC Construction Codes or the Rules of the Department of Buildings requires that material be listed or labeled and material proposed to be used is not so listed or labeled, the use of such material shall be subject to prior approval by the Commissioner (Office of Technical Certification and Research OTCR) and such material shall be used only to the extent set forth in such approval. Materials that were previously approved by the Board of Standards and Appeal (BSA) or by the Department (MEA) before the effective date of the NYC Construction Codes may continue to be used, but only to the extent set forth in such approval, and only if such approval is not specifically amended or repealed by the Commissioner.

PART 2 - PRODUCTS

2.01 DUPLEX VACUUM CONDENSATE RETURN PUMP SETS

A. Provide duplex vacuum condensate return pump sets consisting of cast-iron receiver, 2 water pumps, inlet strainer, separation chamber with 2 air pumps, float and vacuum controls, NEMA Type 2 control panel enclosure as required by Code, and all accessories. Each pump shall be driven by a separate motor.

1. Receiver: Construct of cast iron. Equip with vacuum switches, water level gauge with guard and brass try-cock, dial thermometer, vacuum gauge, air suction check valve, lifting eyes, companion flanges, low water cutoff switch, relief valve and reverse acting temperature limit switch to prevent operation of vacuum pump if the condensate temperature exceeds 1800F.
2. Receiver Inlet Strainer: Construct of cast iron, with removable screen and dirt pocket.

3. Vacuum Condensate Pumps Set: Mount on receiver, factory-wired and piped. Provide unit consisting of multi-jet vacuum producers, centrifugal pump and motor assembly mounted on separation chamber, water level gauge, thermometer, suction swing check valve, air vent, overflow connection, and automatic hurling water level controls complete with air gap. Provide Viton mechanical shaft seals.

4. Water Pumps: Provide flange mounted centrifugal type feed pumps designed for vertical operation. Construct bronze fitted and equip with bronze impeller, renewable bronze case ring, stainless steel shaft, and Viton mechanical shaft seal.

5. Motor Starter Control Panels For Duplex Vacuum Condensate Pump Sets:

   a. For vacuum condensate pump sets serving Building No's 2, 5 & 13, the vacuum condensate pump sets shall each be factory provided with integrally mounted and factory-wired motor starter control panels, as specified.

   b. For vacuum condensate pump sets serving Building No's 1, 3, 4, 6, 7, 8, 9, 10, & 12, the vacuum condensate pump sets shall each be factory furnished with motor starter control panels for remote wall-mounting within the respective associated Domestic Hot water Heater Rooms in the locations as shown on the Contract Drawings, as specified.

      1) The Contractor of Mechanical Div. 23 shall coordinate with the Electrical Div. 26 for provision of electrical power wiring to the remote wall-mounted motor starter control panels, and for the provision of electrical power wiring from the remote wall-mounted motor starter panels to their respective duplex condensate pump set's motors, under the Electrical Div. 26, in conformance with the approved pump set manufacturer's published electrical power wiring diagrams and installation instructions.

      2) Low-voltage control wiring interlocks between the remote wall-mounted motor starter control panels and their respective duplex vacuum condensate pump sets shall be provided under the Mechanical Div. 23, in strict conformance with the approved pump set manufacturer's published control wiring diagrams and installation instructions.

   c. Provide a combination across-the-line type motor starter for each motor consisting of a three-pole main contactor, equipped with thermal over-load relays in each phase leg and a three-pole fused motor circuit switch mounted within the control cabinet and having an externally operable handle. (The switch handles shall be mechanically interlocked with the door, so that the door cannot be opened unless the switch is in the "OFF" position). Also provide seamless reinforced copper float operated switches for the water pumps, and two (2) vacuum regulators. Each duplex unit shall be equipped with two (2) three-position selector switches. Positions shall be designated with suitable nameplates as follows:

      1) Position No. 1: Float & Vac. On

2) Position No. 2: Float On – Vac. Off

3) Position No. 3: Continuous

d. Provide manual sequence control (lead-lag) for each duplex unit. A selector switch (in addition to the two selector switches specified) shall be provided and shall have a nameplate reading: "VACUUM PUMP NO. 1 LEAD - VACUUM PUMP NO.2 LEAD". This control shall provide for (1) manual selection of the active pump, (2) automatic simultaneous operation of both pumps under abnormal load conditions and (3) automatic operation of the inactive pump or lag pump if the lead pump or its control fails.

e. Starters for motors up to and including 3 horsepower shall be Size 1, Type 1, and for motors above 3 HP shall be Size 2, Type 1. They shall be Allen-Bradley, Cutler-Hammer, General Electric Co. CR or Square D.

f. Float switches shall be General Electric Co. CR, Square D or approved equal.

g. Vacuum regulators shall be set for 2" minimum and 7" maximum vacuum. They shall be Cutler-Hammer, General Electric Co., Mercoid Corporation, or approved equal.

h. The combination starters shall be mounted within the control cabinet, with the selector switches mounted on the cover of the cabinet. The control cabinet shall be mounted on the pump set and completely wired at the factory, including wiring between controls and motors, complete and in accordance with NY City Electrical Code requirements. All leads shall be brought to numbered terminal strips to which all external connections shall be made. A complete wiring diagram shall be mounted inside the cabinet door.

5. Vacuum Unit Control Sequence: Provide for manual selection of active or lead pump through lead-lag control on duplex air pumps. Provide simultaneous operation of both pumps under abnormal load conditions and operate inactive pump should active pump fail. Provide float switch in receiver for automatic overflow control, actuating air pumps pulling excess condensate into vacuum unit separation chamber, where it may flow by gravity to drain.

6. Capacity: Each pump shall have not less than the capacity of equivalent direct radiation (EDR) indicated on the Drawings. With all pumps operating, indicated air and water quantities shall be doubled. Quantities of water and air specified are at a temperature of 160oF from 5½-inches Mercury (Hg) vacuum and water quantity given is against discharge pressure indicated.

7. Approved Manufacturers:

   Domestic Pump; ITT Fluid Handling Div. (Basis-of-Design)

   Skidmore Pumps

   SHIPCO Pumps Co.

   MEPCO Marshall Engineered Products Co. (Dunham-Bush, Inc.)

   Federal Pump Corporation

2.02 DUPLEX GRAVITY TYPE CONDENSATE RETURN PUMP SETS WITH VENTED RECEIVER

A. Provide duplex gravity type condensate return pump sets with vented steel receivers, as specified herein and as scheduled and shown on the Contract Drawings. Each unit shall include one steel condensate receiver, two (2) condensate pumps, and an integral motor starter control panel with mechanical alternator. Condensate pump sets shall be as manufactured by one of the following manufacturers, or approved equal:

1. MEPCO Marshall Engineered Products Co. (Dunham-Bush, Inc.) (Basis-of-Design)
2. Domestic Pump; ITT Fluid handling Div.
3. Federal Pump Corporation
4. Skidmore Pumps
5. SHIPCO Pumps Co.

B. The condensate pump shall be centrifugal design; permanently aligned and driven by vertical close-coupled drip proof motors with drip covers. The motor and rotating parts shall be removable without disturbing suction or discharge piping. Pumps shall be bronze fitted with enclosed bronze centrifugal impeller, stainless steel shaft, dripless mechanical seals suitable for up operation at up to 250°F; mechanical seal face flushing line with vent to receiver. Capacities and electrical characteristics shall be as scheduled on the Contract Drawings.

C. The receiver shall be manufactured of rust resisting steel and shall have a capacity of not less than scheduled on the Contract Drawings. Receiver shall be provided with a water level gauge glass, and one (1) mechanical alternator.

D. Duplex condensate pump set shall be factory provided with a factory wired NEMA 2 UL Approved electrical control panel with a disconnect switch and a circuit breaker for each pump, a magnetic motor starter with overloads for each pump, an H-O-A selector switch for each pump, pump running pilot light for each pump, and a control circuit power transformer.

2.03 FACTORY PROVIDED PAINT FINISH

A. Pumps shall be provided with a coat of rust inhibitive paint at the factory and shall be factory finish painted with the manufacturer's standard enamel paint finish.

B. Factory paint the steel door of the control panel with one coat of heat resistant primer and one finish coat of the manufacturer's standard enamel paint finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Support: Install each duplex condensate pump set on a 6-inches high reinforced concrete pad.

B. Connections: Connect condensate piping, valves, vents, drains, pumped condensate return piping, and all other items and accessories.

C. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical. Provide power supply connections to the control panel terminal strip.

D. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 Sections. Do not proceed with equipment start-up unless all connections are completed.

E. Per MC 1004.3, clearances shall be maintained around receivers and related equipment and appliances so as to permit inspection, servicing, repair, replacement and visibility of all gauges. When equipment is installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair. Provide each pump set's integral electrical control panel with a minimum frontal clearance of not less than 42-inches.

3.02 FIELD QUALITY CONTROL/INTERDISCIPLINARY AND FUNCTIONAL PERFORMANCE TESTS

A. Vacuum Condensate Return Pump Sets:

1. Perform a "closed valve test" to confirm pumps generate and maintain vacuum.
2. Demonstrate operability of float and vacuum switches to alternate pumps in sequence.

B. Gravity Type Duplex Return Pump Sets:

1. Demonstrate operability of float switches to actuate and de-actuate pumps, and verify that mechanical alternator switches lead/lag status of pumps after each operational cycle.

C. Interdisciplinary Pre=Startup and Startup Tests:

1. The Contractor shall conduct interdisciplinary pre-start up and start up tests as per the manufacturer's start up procedures. Contractor shall submit signed start up affidavit signed by the factory authorized service representative indicating that all of the manufacturer's pre-start up and start up procedures have been successfully completed.

3.03 CLOSEOUT PROCEDURES

A. Provide Training: Training of NYCHA's designated Maintenance and Operations Representative shall be for a minimum of 4 hours.

END OF SECTION